NO. 84 NOVEMBER, 1965

RESOURCE MANAGEMENT REPORT

ONTARIO

DEPARTMENT OF LANDS AND FORESTS

HON. A. KELSO ROBERTS, Q.C.,
Minister

F.A. MacDOUGALL,
Deputy Minister,

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A SUMMARY OF THE DEER YARD HABITAT IMPROVEMENT WORK IN THE LINDSAY DISTRICT

by J. A. Waddell

Management Forester

ABSTRACT

Deer Habitat Improvement work has been carried out for the past three years in the Lindsay District. The objective of the programme was to attempt to manipulate the winter range of the white-tailed deer in such a manner as to maintain or increase the carrying capacity of the area. During the three-year period approximately 700 gross acres have been treated.

A study carried out during 1964/65 indicated that in the treated area the available browse was increased from 55 pounds per acre to 205 pounds per acre one year after treatment. No detailed assessment work has as yet been carried out, and therefore no precise information is available on the effect of the programme.

During the winter of 1964/65 the third annual deer yard habitat improvement programme was carried out in the Lindsay District. During the first two years, work was confined to yards in Hindon Township. This year, besides continuing in Hindon Township, a yard in Glamorgan Township was also treated. This brings the total area treated in the past three years to something in the vicinity of 700 "gross acres" at an expenditure of approximately $8,500. (Reports are not yet complete for the 1964/65 projects.) As a point of interest, the 1964 deer camp report for this District shows that the largest number of deer shot in any township in the Lindsay District was in Hindon Township, where our work has been concentrated.

Following is a summary of our work, some preliminary observations and our recommendations for future treatment.

The objective in this work is to manipulate the winter range in such a manner that the carrying capacity of the area is increased. To do this we must increase the production of available browse. The methods employed have been aimed at opening up the overstory by girdling and cutting to allow more sunlight to reach the forest floor and to stimulate the regeneration of hardwoods. In the understory, all low-grade hardwood stems that have grown beyond the reach of deer are partially cut through and then bent over to ground or snow level. Since the cambium layer has not been completely severed, many of the trees remain alive for two or three years, thus providing a readily available supply of

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short-term browse while the suckering and sprouting from the root collar is becoming established. No softwood species are cut because of their shelter value. This work has been done both in the yards and within a 2- to 3-chain strip around the nucleus of the yard.

The costs have run between $15 and $30 per "net acre" treated. The past winter's work in Hindon Township cost $16.13 per "net acre" treated.

What, then, are the results to date? No detailed assessment programme has yet been carried out. Therefore, no official results can be stated. But our own examinations show that . . .

(1) The cutting methods we are using will produce abundant suckering and coppice growth year after year. The suckers emanate from three places: the root collar; just below the cut; and in the form of risers turning up from the live part of the tree that has been bent over horizontally on top of the snow. Wherever browsing of the terminal shoot occurred, the lateral buds immediately below the point of browsing took over the following year and produced two vigorous shoots in the case of opposite-branched species in place of the one terminal. This process should continue indefinitely, guaranteeing an abundant supply of food until the browse escapes beyond the reach of the deer.

(2) The open winters we have had for the past two or three years have not forced the deer into their normal tight yarding areas for more than a few days at a time. Food supply has not, therefore, been a critical factor; and while the new growth is being utilized by the deer, only the most succulent 3 to 4 inches of the shoot is being eaten. We have also observed that much of this browsing is done in the fall and early winter. In other words, the food supply which we are creating at fairly high cost has probably not been required and is merely providing "luxury living" for the deer herd.

When we originally undertook this work we estimated that the browse we were creating would be available to the deer for a period of from 7 to 10 years' duration. Now, however, it is apparent that the browse is escaping at a much faster rate than anticipated, and will likely be beyond the deers' reach three to five years after cutting.

(3) An assessment programme was undertaken last fall by members of the District Fish and Wildlife and Timber staffs. This consisted of randomized tagging and measuring of 50 shoots in the deer yard treated the previous winter. These shoots will be remeasured this year. This should give an indication as to the degree of browsing occurring on individual stems and the deers' preference as to species and location of the browse. We hope to be able to expand the assessment programme this fall.

(4) Two sample plots, 1/10 of an acre in area, were located to determine the amount of browse resulting from our work. A control plot was established in a typical over-browsed untreated

portion of the deer yard. All browse which we estimated to be available and edible for the deer was clipped and weighed on the spot. Our findings indicate that a typical acre within the untreated portion of the yard supports about 55 pounds of browse. This compares to a total of 205 pounds of available browse one year after treatment on a typical acre within the adjacent treated area. Therefore, one year after treatment the available browse supply has been increased nearly four times by our cutting techniques.

Recommendations for Future Work

Since the new growth appears to be escaping much more rapidly than we had originally estimated, our future operating methods must be modified in light of the experience gained from our three years' work. The following recommendations are made:

(1) The work of locating and evaluating deer yards on Crown lands within the Lindsay District must be greatly accelerated. This phase is the key to deer habitat improvement work; and until the overall condition of the yards is known, our programme will continue to be on a patchwork basis only.

(2) Instead of treating one or two yards intensively, we should work several yards extensively, possibly covering only 20% of any given yard each year and returning annually until the entire yard has been completed. This would minimize the danger of the growth escaping too rapidly by forcing the deer to browse more heavily within a given area, and at the same time it would provide a ready supply of fresh browse each winter.

(3) Considering the open winters of the past 2 or 3 years, our present programme should be reduced to the point where we are treating only the yards considered to be in dire straits. Then when a severe winter does come, a crash programme could be initiated on several days' notice and a number of yards treated within the District to tide the deer over this critical period.

(4) A long-range assessment programme of deer habitat improvement work should be initiated by the Department without further delay.

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SPRING DEER SURVEYS, SAULT STE. MARIE DISTRICT, 1965

by
N. R. Payne, Biologist

Abstract

Ground surveys were carried out in four yarding areas in Sault Ste. Marie District in May, 1965 to secure information on deer densities and winter mortality and evaluate range improvement work. Density estimates derived from the data were similar to those recorded in the same areas in 1964, suggesting that deer numbers have not changed appreciably in the intervening year. Severe snowfall and temperature conditions during the 1964-65 winter contributed to high rates of mortality in two of the four areas surveyed. Starvation was considered directly responsible for the deaths of some of the dead deer observed. Increases in browse production were noted in both areas where special cutting operations were carried out in 1963. Browse species now occur in the cut-over areas at rates in excess of those reported for untreated portions of the project areas. Hunter success in the fall of 1965 is not expected to show improvement.

Introduction

Pellet group counts and searches for dead deer were carried out at four locations in Sault Ste. Marie District in May, 1965 to ascertain the densities of deer using these wintering areas and to determine the extent of winter mortality. Over the past two years, cutting operations have been undertaken on two of these four areas to increase browse production and in these yards browse surveys were conducted to evaluate the results.

Methods

Permanent transect lines established during the course of previous surveys were followed in all four areas. Along these lines, the sample plots (66 ft. x 6.6 ft.) on which pellet groups were enumerated, were located. The spacing of these plots was every third chain in the Echo River and McMahon Lake areas and every fifth chain in the Red Rock and Hagen Lake areas. A strip two chains wide along the course of travel was searched for dead deer.

Browse stem surveys, following the method of Passmore and Hepburn (1955), were conducted on the compartments and strips which were cut-over in 1963 in the first stage of the range improvement program.

Results

The deer density estimates derived from the pellet group counts appear in Table I along with those obtained for the same areas in the spring of 1964. In both the McMahon Lake and Hagen Lake areas, the estimates, 46.6 and 74.2 deer per square mile, respectively, are little changed from the previous year. In the Red Rock area, an increase from 107 to 138 deer per square mile (29 per cent) is in evidence. There was no information collected on the Echo Lake area in 1964 with which the 1965 findings could be compared.

TABLE I

ESTIMATES OF DEER PER SQUARE MILE
IN STUDY AREAS

YEAR	ECHO RIVER AREA	MCMAHON LAKE AREA	RED ROCK AREA	HAGEN LAKE AREA
1964	-	45.2	107	70.9
1965	88.4	46.6	138	74.2

The number of carcasses of deer found during the surveys make it obvious that deer mortality over the winter of 1964-65 was high in two of the yarding areas. In the Red Rock area, 13 dead deer were located on the strip searched, 12 more than 1964; and in the Echo River area seven carcasses were found, three of which were on the survey strip. The estimated mortality projected from these counts was 27 and 36 per cent respectively for the Red Rock and Echo River yards.

Only one dead deer was discovered in each of the remaining two areas by the survey crews. This represents no change from last year for the Hagen Lake area, but the single deer found in the McMahon Lake area is an increase.

The deaths of six of the deer found in the Red Rock area and that of the single dead deer observed in the Hagen Lake area were attributed to starvation. Of these, two that were aged were found to be fawns. Three of the deer in Red Rock area were thought to have been shot and the remaining four gave evidence of having been killed by predators.

The carcasses of deer encountered during the surveys in the Echo River and McMahon Lake plots were, in every case, broken up and scattered. It was therefore difficult to establish with certainty the cause of death. It is likely that a combination of wolves and malnutrition was responsible for the high mortality at the Echo River yard.

The results of the browse survey carried out on the cut-over strips in the McMahon Lake area (Appendix II) indicate that since the time of the 1964 survey the number of available browse stems has nearly doubled. Preferred browse species, primarily maple, occurred on the strips at the rate of 3812 stems per acre in 1965, a rate 98 per cent greater than that recorded in 1964 (1957 stems per acre). More important, production of browse on the strip now exceeds that observed over the remainder of the 537-acre area in 1963 (3014 stems per acre).

The tally of stems of browse species on the sample plots in the cleared compartments in the Red Rock area provide evidence of a 20 per cent increase in browse production there. Stems numbered 11,855 per acre (estimated) in 1965, 2143 more than in 1964. Significantly, browse species occur on the cut-over areas at more than twice the rate at which they were reported for the entire project area in 1963 (5,399 stems per acre), the year in which cutting operations commenced.

Utilization of available browse by deer, as indicated by the percentage of living stems browsed, continues at a high level (Appendix II). This indicates that deer are deriving benefit from the increase in browse production effected by the range management program.

Discussion

The similarity of the deer density estimates obtained in 1965 with those derived for the same areas in 1964 suggests that the past year has resulted in little change in deer abundance. Thus, the survey findings tend to be in accord with the returns from the 1964 deer hunter survey. Resident hunter success declined to 12.2 per cent from 13.0 per cent the previous year, but, at the same time non-resident hunter success increased by approximately one per cent. Essentially, there was little difference between hunter success in the two years.

Recruitment, as indicated by the percentage of fawns in the sample of hunter-killed deer examined was much lower (25 per cent) in 1964 than anticipated and apparently was only sufficient to balance annual mortality. A factor other than the preceding winter climate and food conditions is believed responsible for the lower recruitment.

Winter severity indices derived from snow measurements at a number of stations located throughout the deer range (Appendix III) reveal that, from the standpoint of the hardships imposed on deer, the winter of 1964-65 was the second most severe to occur in the last thirteen year period. In the Sault Ste. Marie area, a new record for total snowfall was set. In the bush, the snow depth exceeded 25 inches for a total of nine weeks. Below normal temperatures which meteorological records show prevailed during the December-February period added further to the winter stresses.

The increase in mortality over the previous winter can be credited largely to the severity of winter conditions. As indicated, starvation was apparent in some areas. It is noteworthy that in the McMahon Lake area where mortality was comparatively light, the severity index was only 13, much less than the District average of 27.8.

Hunter success in the fall of 1965 is not expected to improve. Natural mortality will have substantially reduced the deer population surviving the 1964 season, particularly last years fawn crop. Also, it is expected that the adversity of the past winter will be reflected in the number of fawns produced in 1965.

Acknowledgments

Thanks are extended to the personnel of the Sault Ste. Marie and Blind River Divisions who participated in the spring surveys.

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APPENDIX I

DEER ESTIMATES

	Echo River	McMahon Lake	Red Rock	Hagen Lake
Area	416 acres	537 acres	1150 acres	868 acres
Number of plots	92	215	212	329
Number of new pellet groups	306	379	1102	921
New pellet groups per plot	3.33	1.76	5.20	2.80
Deer per square mile*	88.4	46.6	138	74.2

*Based on 12.7 pellet groups per day and a 190-day wintering period.

APPENDIX II

MCMAHON LAKE AREA - ABERDEEN TWP.
BROWSE SURVEY ON CUT-OVER STRIPS
SUMMARY DATA FOR 26 PLOTS

Species	No. of Plots	Living Stems per acre	% of Stems Killed	% of Stems Browsed	Avail-ability	% of Total Stems Browsed
Sugar Maple	19	2310	8.3	72.5	60.5	79.5
Soft Maples	19	805	8.0	39.3	21.1	15.1
Hazel	14	514	1.2	12.3	13.5	3.0
Birches	7	89		35.7	2.3	1.5
Cedar	1	51		0	1.3	0
Elderberry	2	19		33.3	0.5	0.3
Poplar	1	12		100.0	0.3	0.6
Juneberry	2	12		0	0.3	0
		3812				

APPENDIX II (CONT'D)

RED ROCK AREA - GLADSTONE TWP.
BROWSE SURVEY ON THREE CUT-OVER COMPARTMENTS
SUMMARY DATA FOR 14 PLOTS - 1965

Species	No. of Plots	Living Stems per acre	% of Stems Mutilated	% of Stems Killed	% of Stems Browsed	Avail-ability	% of all Stems Browsed
Poplar	14	4478	32.1	20.5	78.9	37.7	37.3
Hazel	13	3064	36.2	21.6	86.9	25.8	28.1
Willow	14	2569	48.6	26.8	76.1	21.6	20.6
Sugar Maple	4	943	35.0	14.9	82.5	7.9	8.2
Birch	3	495	23.8	12.5	66.6	4.2	3.5
Soft Maples	2	306	46.2	18.7	69.2	2.6	2.2
		11,855					

APPENDIX III

WINTER SEVERITY INDICES
SAULT STE. MARIE DISTRICT

Snow Station	Winter 1953 1954	1954 1955	1955 1956	1956 1957	1957 1958	1958 1959	1959 1960	1960 1961	1961 1962	1962 1963	1963 1964	1964 1965
Elliot Lake*						32	16	0	12	15	15	39
Blind River Lake on Mt.									7	10	4	26
Blind River * Lower Lauzon	0	1	5	5	0	17	2	0	10	10	3	22
Gladstone Twp. Cover - Area										5	1	20
Wells Twp.* Basswood	13	13	29	26	15	38	17	1	19	20	19	35
Kirkwood Twp.									20	15	8	28
Poplar Dale Cover - Area										6	11	13
Richards Lndg.* Hilton Lake	1	5	19	11	0	21	8	0	13	8	14	14
Island Lake*	29	24	44	42	33	50	33	7	36	20	29	39
Garden Lake												
Cranberry Cr.									28	9	17	26
Batchawana Bay	4	5	24	32	5	39	23	8	22	19	10	18
Mean	9.4	9.6	24.2	23.2	10.6	32.8	16.5	2.7	18.7	23.4	18.0	27.8
Type of Winter	Mod.	Mod.	Sev.	Sev.	Mod.	Ext.	Mod.	Lig.	Mod.	Sev.	Mod.	Sev.

*Stations included in the calculation of the mean index.

Index Value	Description of Winter
0-9	light
10-19	moderate
20-29	severe
30+	extreme

*After method outlined by R. Hepburn - Research Branch - Maple

ASPECTS OF HUNGARIAN (GRAY) PARTRIDGE ECOLOGY IN EASTERN ONTARIO.

by
J. B. Dawson, Biologist
Southern Research Station, Maple

Abstract

This paper summarizes the present distribution and approximate covey density of the Hungarian (gray) partridge in Ontario. Comparisons with respect to fall age and sex ratios and average autumn covey size are made with other partridge populations in western prairie habitat. Factors such as habitat, climate, soils, farm practices and hatching periods which have influenced the success of this partridge in eastern Ontario are dealt with in some detail. The writer concludes that the key to successful partridge populations in eastern Ontario may be the high percentage of successful first nestings with an associated high average covey size, high juvenile-adult ratio and low percentage of renesting.

Introduction

Plantings of small numbers of Hungarian partridge were made in southern Ontario in the early 1900's. From 1927 to 1938 inclusive, an additional 3,832 partridge, raised on Provincial game farms, were released in almost every county and territorial district of the Province. Several colonies were established, and some still persist at low population densities; only one, located in the eastern counties of southern Ontario, has flourished. This paper describes certain characteristics of this colony; these are compared with those of other successful partridge populations.

Distribution and Abundance

Figure 1 shows the present distribution and approximate covey density of partridge in Ontario, with the exception of a small colony which persists within the city limits of Port Arthur in northwestern Ontario.

Huntable densities of partridge have occurred consistantly only in eastern Ontario. In exceptionally good years, e.g. 1953, population densities exceeding one bird for every 10 acres have been recorded on the best range; from 1958 to 1962 the better habitat has supported about one covey for every 150 acres and approximately one bird for every 11 acres.

The Hungarian partridge in Ontario has not reached the levels reported for western or prairie habitat. For instance, Keith (1958b) suggests that partridge may have reached densities of a bird per three acres in good years in the vicinity of Edmonton, Alberta. However, the eastern Ontario population has provided excellent hunting opportunities and annual open seasons have been declared since 1949.

Characteristics of Eastern Ontario Partridge

Juvenile - Adult Ratios

Several characteristics of the eastern Ontario partridge population indicate its vigour. Firstly, juvenile-adult ratios in fall are higher than in many other partridge populations for which data are available.

Table 1 shows that the average juvenile-adult ratio of 3.47:1 for eastern Ontario (14 years data) is exceeded only by the 4.07:1 ratio observed by Westerskov (1951) during a particularly good partridge year in Denmark. The eastern Ontario average is higher than for large samples taken from both Saskatchewan and North Dakota, both of which have supported good partridge populations. Edminster (1954) states that "an age ratio exceeding about 2.2 juveniles per adult is usually indicative of equal or increasing populations, whereas a ratio below 2.2:1 reflects lower numbers in proportion to the lowness of the ratio". The juvenile-adult ratio has dropped below 2.0 in eastern Ontario in only two years since 1950.

TABLE I Fall Age Ratios of Hungarian Partridge

Region	Sample Size	No. Years	Juv.*/Ad. Ratio	Authority
Eastern Ontario	3868	14	3.47:1	This study.
Saskatchewan	1576	4	3.00:1	Folker (1961)
North Dakota	8705	10	3.34:1	Johnson (1961a).
Alberta	131	4	3.09:1	Keith (1948a).
Wisconsin	296	1	3.29:1	Hickey & McCabe(1953)
Denmark	140	1	3.37:1	Paludin (1954)
Denmark	6065	1	4.07:1	Westerskov (1951)
Great Britain	34817	2	1.81:1	Middleton (1936)

* birds of the year.

Covey Size

A second characteristic of the eastern Ontario "Hun" population has been large covey size in fall. The average size of 362 coveys observed from 1950 to 1962 during September and early October has been 13.1 birds. This average is larger than the September covey sizes reported for other populations. Data for September coveys reported in the literature are shown in Table II.

TABLE II Average Autumn Covey Sizes of Hungarian Partridge

Region	Years	Time	No. Coveys	Average Covey Size	Authority
Eastern Ontario	1950-62	Sept. and early Oct.	362	13.1	This study.
Michigan	1932-33	Sept.	8	10.3*	Yeatter(1934)
North Dakota	1958	Sept.	20	12.9	Johnson(1961b)
	1959	Sept.	16	8.4	
	1960	Sept.	19	11.9	
North Dakota	1940	Late summer	79	11.75	Hammond(1941)
Washington	1940	2 mths. after hatching	39	9.5	Yocom(1943)
Denmark	1949	Fall	493	12.0	Westerskov (1951)
England	1953	Sept.	18	9.1	Jenkins(1961)
	1954	Sept.	21	8.4	

* Assuming each brood accompanied by two adults.

The covey data for three years for North Dakota come closest to the Ontario long term average, but still fall far short of the years 1957, 1958 and 1959 when 96 September-October coveys averaged over 15 birds each year in eastern Ontario.

Sex Ratios

Also of interest is the sex ratio of eastern Ontario partridge. Many workers have described an imbalance in sex ratio favouring males in adult partridge. Keith (1958a) showed that the ratio of males to females in adults was 56:44 for several studies in Europe and North America. Could a higher survival of hens be a contributary factor to good populations in Ontario? Table III indicates that the Ontario sex ratio for adult partridge is very similar to that for other populations; therefore differential survival does not appear responsible for the "Huns" success in eastern Ontario.

TABLE III Fall Sex Ratios of Hungarian Partridge

Region	No. Years Data	Per Cent Males Adults	Juveniles	Authority
Eastern Ontario	14	56.2(849)*	46.0(2484)	This study.
Wisconsin	1	55.1(69)	52.4(227)	Hickey & McCabe (1953)
North Dakota	8	57.8(1829)	49.3(6213)	Johnson(1961a)
Denmark	1	54.4(1197)	-	Westerskov(1951)
Great Britain	2	61.5(273)	47.2(481)	Middleton(1935)

*Sample Size

Factors Influencing Success of Partridge in Eastern Ontario

What then are the factors responsible for the success of the partridge in eastern Ontario?

Habitat

The basic qualities of good partridge habitat, as described by Westerskov (1948), include: rolling to flat topography with intensively cultivated land; a variety of crops including small grains, hay, beets, potatoes, pasture and agricultural weeds; suitable nesting sites in fencerows, hedgerows and ditch banks; and small medium sized farms. Summers should be cool with low precipitation and food should be available in winter. Most successful partridge populations have occurred on a light sand or sandy loam soil type.

How does eastern Ontario rate as partridge habitat? Land use is favourable; intensive dairy and livestock farming predominates and small grains, hay, pasture and corn are the principal field crops. These, grown on the flat clay plains of the Nation River drainage system appear ideally suited to partridge. However, farms are large, most containing from 100 to 150 acres. Suitable partridge nesting sites occur along fencerows, and the banks of the ditches necessary to overcome imperfect soil drainage. Many nests are located in hay fields as well.

Climate

Summer weather, a vulnerable period for young partridge, is considered to be a major limiting factor to partridge production. High chick mortality is associated with high rainfall and low temperatures in June and July and the old English saying that "June makes partridges" appears well founded. Westerskov (1949) points out that precipitation in the best partridge range in Europe averages 2-1/4 and 2-1/2 inches for June and July, respectively. Average rainfall for three weather stations within the eastern "Hun" range is just under three inches for June, just over three inches for July. June rainfall has exceeded four inches during four years since 1950.

Summer temperatures are slightly higher than those which occur on the optimum European range. Winters in eastern Ontario are severe; most of the "Hun" range is subject to snowfall which varies from 72 to 96 inches annually. Also, occasional winter ice storms have caused significant partridge mortality.

Soils

Best partridge densities have occurred on heavy clay soils in eastern Ontario; indeed every permanent or semi-permanent

partridge colony in Ontario has occurred on clay soil. It is interesting that Kokes and Knoblock (1947) state that Czechoslovakian partridge appear to prefer heavier soil types, although Westerskov (1948) and others have mentioned the desirability of lighter soils.

Land-use does favour partridge in eastern Ontario; climate compared to that enjoyed by other successful partridge populations does not appear exceptionally favourable.

Farm Practices

There are other important factors that effect the welfare of partridge. On this continent the "Hun" has had marginal success in the humid north-east and many workers believe that nest losses caused by hay mowing is a major factor suppressing populations in the east. In Wisconsin a large scale nesting study, reported on by McCabe & Hawkins (1946), showed that 68 per cent of initial nests were broken up, 53 per cent by hay mowing; in that State mowing occurred during the peak hatching period for each of seven years. Westerskov (1948) discussed declining partridge populations in the Lake States and ascribed the decline to unsuitable climate and the high nest mortality due to hay mowing. He stated that "the nest mortality is far too high for the persistance of a population of game birds".

Hatching Period, Peak of Mowing and Renesting - Eastern Ontario

Unusually low nest mortality may be an important factor in the continued success of the "Hun" in eastern Ontario. In the eastern counties, imperfect soil drainage, climatic factors and farm customs of long standing contribute to a late hay harvest. Haying usually commences during the last week of June and often does not reach a peak until the second week in July. From 1957 to 1962 the peak of the partridge hatch occurred during the week of June 15-21 (2 years) and during June 22-28 (4 years). Very little hay had been cut by these dates.

In eastern Ontario hunter-taken juveniles aged by measuring the shortest ingrowing primary (Petrides, 1951) indicated that about 50 per cent of the hatch had occurred before the onset of hay mowing activities in most years. In Wisconsin in 1941 the hatching peak occurred on July 1 and haying commenced on June 15, according to McCabe & Hawkins (op.cit.). Yeatter (1934) reported that hay mowing normally commenced about June 10 in southern Michigan. With modern farming trends towards earlier hay cutting to obtain higher protein values, it is likely that hay cutting now commences at an even earlier date in these states. In southwestern Ontario, for instance, haying now usually starts during the first week of June.

Low losses of initial partridge nests may produce larger coveys and an associated high autumn juvenile-adult ratio in eastern Ontario. The "Hun" is an indeterminate egg layer and is capable of laying two or more clutches if the first ones are destroyed. Second clutches are smaller than initial ones. Yocum (1943) found that renest broods averaged 4.5 young while first hatch broods averaged 10.7 young in Washington. Yeatter (op.cit.) observed a decrease in clutch size in the partridge from 19 in June to 9 in August in Michigan. Other workers, including Lack (1947) and Jenkins(1961) have described a decrease in the clutch size of partridge as the season progresses. Data from several sources suggest that second clutches average about one-half those of first nestings.

Renesting percentages appear to be closely associated with hay mowing and time of hatch in eastern Ontario.

Table IV shows the cumulative per cent of hatch, by week, the hay mowing period and the percentage of renesting for the years 1957 to 1962. Birds whose moult indicated a hatch after July 19 were considered as products of renestings. From 1960 to 1962, the hay mowing period, per cent of hatch and per cent of renesting are similar. In 1958, hay mowing was delayed and over 90 per cent of the hatch came off before hay harvesting commenced; the renesting per cent is correspondingly low. Similarly in 1957 and 1959, a high percentage of nests had hatched by June 28 and this apprently lowered the number of renestings, although the 10.3 per cent renesting in 1959 is lower than might be expected from the hay cutting period.

TABLE IV Percentage of Hungarian Partridge Hatched by Week Eastern Ontario 1957-1962

Year	No. in Sample	Cumulative % of Hatch and Hay Mowing Period					Per cent Renesting
		21 JUNE	28	5 JULY	12	19	26	2 AUG	
1957	31*	45.9	66.0	82.6	90.9	99.1			10.0
1958	103**	25.2	53.3	68.8	90.2				1.9
1959	232**	50.4	73.7	80.2	83.2	89.7			10.3
1960	353**	28.3	50.9	60.3	71.9	76.2			23.7
1961	456**	17.3	43.5	63.4	71.2	78.2			21.7
1962	524**	33.4	46.0	62.4	72.3	79.0			20.9

* Coveys
** Birds ⟷ Arrow beneath figures denotes haycutting period.

From 1958 to 1962, 19.8 per cent of 1,668 juvenile partridge hatched later than July 19. Although few references on renesting are available, the frequency of renesting appears to be lower in eastern Ontario than in many other regions. According to Westerskov (1957), approximately 25 per cent of juvenile partridge come from repeat nests in Denmark, and this worker states that renesting reaches 36 per cent in France. Paludin (1954) found a renesting percentage of 36 per cent in Danish partridge in 1953. No data on renesting for eastern United States are available; however considering the very heavy losses of initial nests which have been reported, the renesting percentage must be high.

Edminster (1954), in a theoretical life equation for Hungarian partridge in the United States shows 34 per cent of hatched chicks resulting from renesting attempts. In North Dakota, hatching dates for almost 5,000 partridge over a 7-year period indicated that 20.6 per cent had hatched after July 21 (Johnson 1961a). Considering the basic differences in land-use and farm practices between North Dakota and eastern Ontario, the similarity to the Ontario renesting percentage of 19.1 is surprising.

In summary, a high percentage of successful first nestings with an associated high average covey size, high juvenile-adult ratio and low percentage of renresting, may be the key to successful partridge populations in eastern Ontario. Earlier mowing which causes higher nest losses may limit success of the "Hun" in the Lake States and elsewhere in southwestern Ontario.

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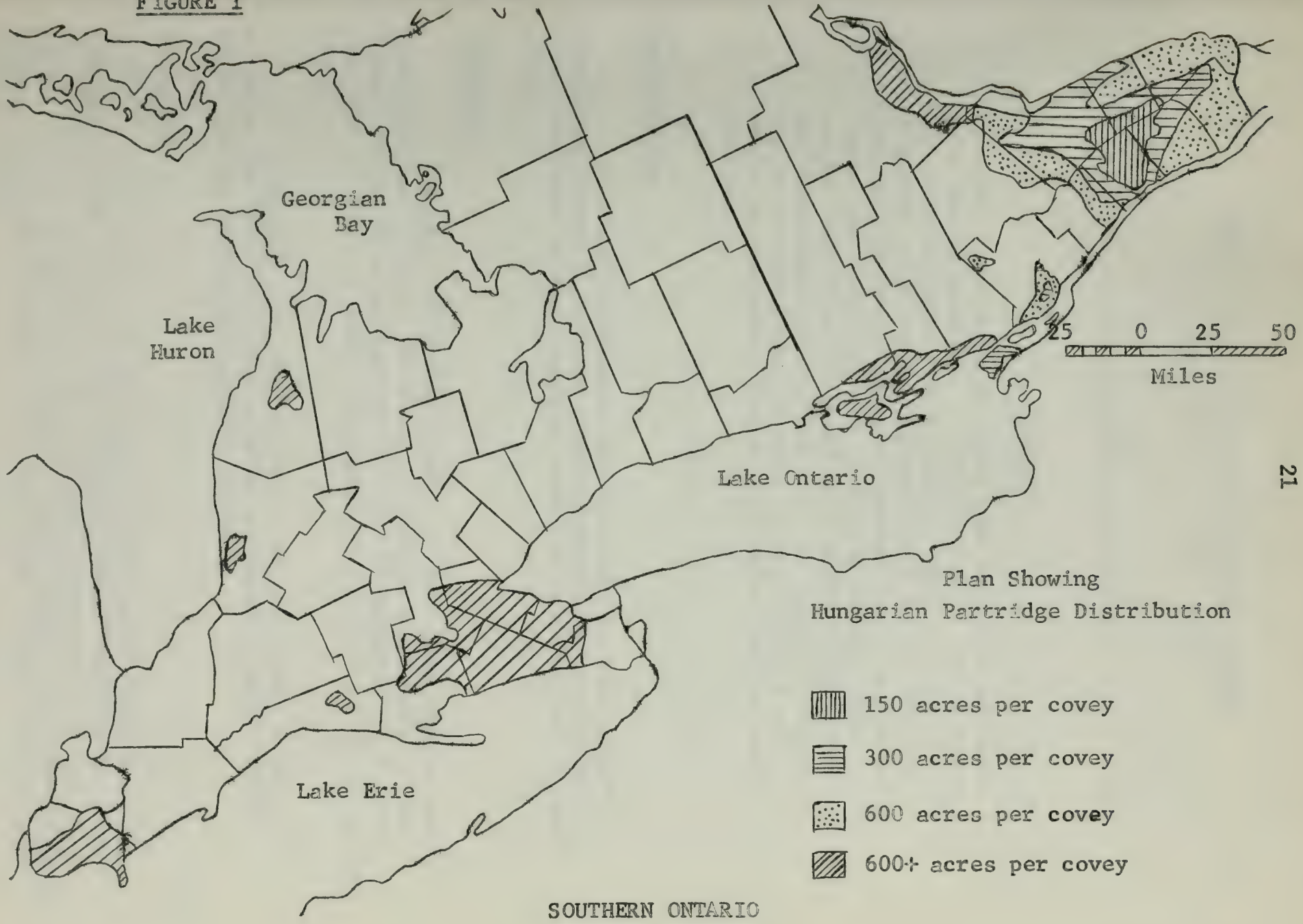
FIGURE I



SOUTHERN ONTARIO

RUFFED GROUSE ROADSIDE DRUMMING SURVEY
COCHRANE FOREST DISTRICT, 1965

by
W. A. Creighton, Biologist

Abstract

In order to provide an index upon which an estimate of relative abundance of breeding male ruffed grouse could be determined from year to year, a roadside drumming count survey was conducted during May, in Cochrane District. Results showed that the abundance index (the District mean of 16.4 drummings) when compared with the 1963 and 1964 indices, indicated an improvement of 14.7 per cent in relative abundance. It is predicted that hunters in the District will enjoy an increasing grouse population for the next few years.

Introduction

In order to increase our knowledge of ruffed grouse population trends, a roadside drumming survey was conducted in three divisions of the Cochrane Forest District during the month of May.

Objective

General - To follow trends in the ruffed grouse population from year to year, in order to predict accurately to the hunter, the calibre of hunting that may be expected in a given year and for several years in advance with reference to the grouse cycle.

Specific - As part of our total pre-season study to estimate the trend of the population of breeding male ruffed grouse in the spring from year to year.

Procedure

For details of this survey which was established on a routine, annual basis for the Cochrane Forest District in 1963, the reader is referred to the standard techniques and maps 1. to 11. listed in the 1963 report, "Ruffed Grouse Roadside Drumming Survey, Cochrane District, 1963" and filed in Maple and Cochrane District Office.

Results

On two separate occasions, 6 to 13 days apart (see Table I), each of eight Conservation Officers, one Biologist, one Deputy Chief Ranger and one Forest Ranger conducted a ruffed grouse drumming survey.

First run of 10 transects, dates May 6 - May 14, 53 of 130 check points were heard from or 40.8 per cent of the listening stops involved.

Second run of 10 transects, dates May 12 - May 24, 49 of 129 check points were heard from or 38.0 per cent of the listening stops involved.

A total of 151 drummings were heard over the two runs on ten transects (see Table II).

Officers were to note on the report form under comments or suggestions whether or not certain drummings heard, came from the same general direction as previous ones and thus from the same grouse. A range in the total count of drumming male ruffed grouse present on territory varied from 88 to 126. Eighty-eight (88) grouse represented the minimum number of birds heard at different check points on the first and second run, whereas 126 grouse represented the maximum number of birds heard regardless of overlap at the same check point. For example, on Transect 2. East (Brower) Road check point 2. (see Table II) one ruffed grouse was heard drumming both survey days, May 8 and May 18. Whether or not this grouse was the same bird heard both days was not determined. Therefore, the number 126 represents the assumption that it was a different bird, whereas the number 88 represents the opposing assumption that it was the same bird.

Range of "audibility" was considered at one eighth of a mile, therefore, 31 acres represented the area of one check point. First run of ten transects (130 check points) represented a total audibility area of 4,030 acres (6.3 squares miles) providing a population of one drumming male per 32 acres or 11.4 drumming males per square mile.

Second run of ten transects (129 check points) represented a total audibility area of 3,999 acres (6.2 square miles) providing a range of population from one drumming male per 74 acres (8.6 drumming males per square mile).

The estimated range of the two runs reveals a population of one drumming male per 56-74 acres (8.6-11.4 drumming males per square mile).

Favourable weather conditions prevailed throughout the 19 days required to complete both runs of the drumming survey.

Only five ruffed grouse were observed along the transects this year compared with eight ruffed grouse in 1963 and four spruce and four ruffed grouse in 1964.

TABLE I

Survey Transects, Dates, Days Since Run 1., and Time Involved (Average of Run 1. and 2.)

Transects 1. to 10.	Run 1. Date	Run 2. Date	Days Since Run 1.	Time Involved (average of Run 1. and 2.)
	May			
1. Clute Road	8	18	11	1 hr. 39 min.
2. East (Brower) Road	8	18	11	2 hr. 8 min.
3. O. N. Railway	6	18	13	2 hr. 19 min.
4. Dunn's Lake Road	7	12	6	2 hr. 4 min.
5. Abitibi Pulp and Paper (Camp 39)	-	18	-	50 min. (only 10 check points)
6. Abitibi Trans-limit Road	12	18	7	1 hr. 48 min.
7. Warren and Jowsey Lake Roads	10	18	9	1 hr. 38 min.
8. Kamiskotia Lake Road	13	24	12	1 hr. 35 min.
9. Gibson Lake Road	14	23	10	2 hr. 18 min.
10. O. N. Railway Mileage 158 to 142	13	-	-	2 hr. 45 min.
Total Transects 10	Runs 18		Average Time 2 hr. 2 min. (excluded T5 time)	

TABLE II — Ruffed Grouse Drumming Counts (May 6 to May 24)

Sampled Area	Date	Check Points 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	No. of Drummings	No. of Birds Heard	Aver. No. of Drummings/ 4 Min. Period
Cochrane																				
1. Clute Road	May 8	-	-	-	3	2	2	-	2	-	-	3	-	2	?	?	?	14	8	.76
	May 18	1	-	-	1	-	1	-	-	-	-	3	-	1	1	-	-	8	7	
2. East (Brower)	May 8	-	1	-	-	1	1	1	2	-	1	2	-	2	-	3		14	13	.80
Road	May 18	-	1	2	-	1	1	1	1	-	-	1	1	1	-	-		10	10	
3. O.N.R. (Clute	May 6	2	-	1	-	-	2	3	-	2	-	-	-	-	1	2		13	12	.80
Sta. northward)	May 18	2	-	2	-	-	1	5	-	-	-	1	-	-	-	-		11	6	
4. Dunn's Lake	May 7	-	-	-	-	4	3	-	1	-	2	-	-	-	-	1		11	8	.57
Road	May 12	-	1	-	-	1	1	-	1	1	-	-	-	-	-	1		6	6	
Smooth Rock Falls																				
5. Abitibi Pulp and Paper Road (Camp39)	May 18	1	-	1	-	-	1	1	-	-	1	?	?	?	?	?		5	5	.50
Iroquois Falls																				
6. Abitibi Trans-	May 12	2	-	-	2	-	1	-	-	2	1	2	-	-	-	-		10	7	.73
limit Road	May 18	2	-	-	-	-	5	-	1	1	2	1	-	-	-	-		12	8	
Timmins																				
7. Warren & Jowsey	May 10	1	-	2	-	-	1	-	-	1	1	-	-	1	1	1		9	9	.47
Lake Road	May 18	-	-	1	-	-	-	-	-	1	1	-	-	1	1	-		5	5	
8. Kamiskotia	May 13	-	-	-	-	1	-	-	-	1	-	-	2	-	-	-		4	4	.30
Lake Road	May 24	-	-	-	1	1	1	-	-	-	-	-	1	1	-	-		5	5	
9. Gibson Lake	May 14	1	1	2	-	-	-	-	1	2	1	1	-	?	?	?		9	8	.44
Road	May 23	-	1	-	-	-	-	-	-	-	1	-	-	-	?	?		2	2	
Moosonee																				
10. O.N. Railway Mileage 158 to 142	May 13	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-		3	3	.20
														Totals				151	126	.60

TABLE III Weather Conditions

Date	General Outlook	Temp. ^{o} F.	Wind (m.p.h. * and direction)
May 6	Clear, cool	32^{o}	Calm
May 7	Clear becoming overcast 2/10 to 10/10	35^{o}	South-east 0 to 5
May 8	Light overcast	48^{o}	South 0 to 3
May 10	Cloudy	56^{o}	East 0 to 3
May 12	Light overcast	56^{o}	South-west 0 to 5
May 13	Clear, cool	32^{o}	Calm
May 14	Clear, cool	42^{o}	South-west 0 to 3
May 18	Clear, cool	38^{o}	South 0 to 3
May 23	Clear, cool	40^{o}	Calm
May 24	Clear, cool	41^{o}	Calm

* Wind velocity in m.p.h. estimated

The total population of ruffed grouse, considering a sex ratio of 50:50, would be one grouse per 28-37 acres (17.2-22.8 grouse per square mile). This estimate is an average figure for the area surveyed. It does not present an absolute number or a uniform number of grouse per acre or square mile because grouse may be locally abundant or lacking depending upon the quality and availability of food, water and cover in their environment.

According to several authors, Allen, Handley, Trippensee, classification of range as per carrying capacity per acre is as follows:

	Carrying Capacity/Acre Acres			
	Poor	Fair	Good	Excellent
One Ruffed Grouse per	40	20	10	4

Since all ten transects of the drumming survey passed through fair to excellent habitat the population figure arrived at again this year suggests a low population. In order to qualify this statement we mean a low population with respect to the numbers of grouse the land will support, that is the carrying capacity of the range. From data available the trend in the breeding population of ruffed grouse is toward general improvement.

Discussion

The sampling technique (roadside drumming counts) used again this spring provide an index (drumming male ruffed grouse) upon which an estimate of relative abundance of breeding male ruffed grouse from year to year could be determined. This abundance index, the District Mean of 16.4 drummings, when compared with the 1963 and 1964 indices, indicates a good improvement of 14.7 per cent in relative abundance (see Table IV).

In addition to the above estimate of grouse population trends a second index is determined. The average number of drummings heard per four minute period is computed for each transect. If in one season that transect was run more than once under favourable conditions, the average number of drummings per 4 - minute period was computed for all runs combined. District averages were determined and used as indices to population changes from year to year. When compared with the 1963 and 1964 indices of .47 and .48, respectively, the 1965 index of .60 (+25.0%) indicates a very good increase in the number of drummings heard at each check point during the 4-minute listening period.

TABLE IV

Ruffed Grouse Drumming Counts - Cochrane Forest District
Abundance Index

Sampled Area	1963	1964	1965	Average No. of Drummings/ 4 Minute Period 1963	1964	1965
1. Clute Road	11	6	22	.32	.1[illegible]	.76
2. East (Brower) Road	22	17	24	.73	.57	.80
3. O.N.R. (Clute Station Northward)	38	26	24	1.27	.87	.80
4. Dunn's Lake Road	6	22	17	.20	.73	.57
5. Abitibi Pulp and Paper Road (Camp 39)	11	0	5	.37	0	.50
6. Abitibi Translimit Road	14	12	22	.47	.40	.73
7. Warren and Jowsey Lake Roads	4	28	14	.27	.93	.47
8. Kamiskotia Lake Road	10	13	9	.33	.43	.30
9. Gibson Lake Road	8	5	11	.27	.17	.44
District Mean	13.8	14.3	16.4	.47	.48	.60
Percent Change	-	+3.6%	+14.7%	-	+2.1%	25.0%

It is reasonable to predict that we will enjoy increasing grouse populations for the next few years although predictions on the type of hunting season we can expect will depend largely upon the breeding success and brood survival of ruffed grouse during the interval from spring to early fall.

Contributing Personnel:

Cochrane	- S. Nodwell
	- M. Craig
	- S. Harris
Smooth Rock Falls	- K. Veitch
Iroquois Falls	- J. McWhirter
Timmins	- G. Barnett
	- R. Cool
	- C. Flood
Moosonee	- G. English
	- G. Ross

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SYSTEMATIC HARE SURVEY, LAKE HURON DISTRICT, 1964

by
W. D. Mansell, Biologist

Abstract

During the period 6 December, 1964 to 27 March, 1965, an attempt was made to measure the hunting pressure on European hare in seven Huron County townships and three Bruce County townships. Systematic car patrols of specified townships, aircraft-car patrols of 10 entire townships, participation in hunter drives and general patrols in their own area were carried out by field staff. Considering Saturdays only (19 Saturdays for Hay and Stephen townships, 29 Saturdays for the remaining townships), 1593.9 hunter-days were spent by hunters for European hare resulting in a daily success of 0.50 hares per resident hunter and 0.55 hares per non-resident hunter. The ratio of resident to non-resident hunters over the 850 square mile study area was estimated at 4.9:1. The projected kill for Saturdays in the open season was estimated at 2500 European hares, 398 varying hares, 361 cottontails and 36 foxes. Approximately 44 per cent of the hunters present in the study area on census days were contacted by field personnel. The results obtained from participation in hunter drives suggested that only 23 per cent of the European hares sighted were shot. Population figures for European hare on the study area, although of a crude nature, suggest there were in excess of 13 European hares per square mile.

Introduction

With an increase in the number of complaints by local hunters that American sportsmen were over-harvesting European hare populations in Huron and Bruce Counties by large scale systematic hunts, Lake Huron District proceeded to appraise the situation. The townships of Stephen, Hay, Stanley, Goderich, Colbourne, Ashfield and Morris in Huron County and the townships of Bruce, Kincardine and Saugeen in Bruce County were subjected to patrols by field officers to determine the extent and success of non-resident hunting. (Figure 1).

Methods

The study program was separated into four different aspects, systematic patrols, aircraft-car patrols, random patrols and "drives".

Systematic patrols were run on seven days between 5 December, 1964 and 27 March, 1965. Townships were covered in a predetermined order so that data could be applied to a value index of each unit. The following information was recorded for each township: the number of cars and their residency, the number of hunters per car, a bag check of hunters interviewed, the mileage driven in each patrol and the number of hares observed en route. Table I summarizes the results.

TABLE I HARE SURVEY

RESULTS OF SYSTEMATIC PATROLS
IN HURON & BRUCE COUNTY
1964-65

	December		January		February		March		Totals
Statistic	5	19	9	23	6	20	6	27	115
1. Miles covered	343	658	594	324	389	400	265	324	3297
2. Number of cars	7	18	25	7	4	8	2	1	72
Resident	7	18	20	7	2	4	1	1	60
Non-resident	0	0	5	0	2	4	1	0	12
3. Number of Hunters	25	59	64	20	20	32	11	2	233
Resident	25	59	56	20	13	18	5	2	198
Non-resident	0	0	8	0	7	14	6	0	35
4. Bag Check (European Hare only)	9	41	28	25	11	35	11	0	160
5. European Hare Sighted (25 by hunters)	4	6	1	7	5	2	0	3	28

Interpolated Figures *3.25 hunters per car, 0.69 European hare per hunter, 0.01 cottontails per hunter, 0.11 varying hare per hunter, 0.01 fox per hunter

TABLE II
SYSTEMATIC HARE SURVEY

RELATIVE CONTRIBUTION OF TOWNSHIPS TO THE HARE HUNT

Township	Morris	Colbourne & Ashfield	Kincardine	Bruce	Saugeen	Hay	Stanley & Goderich	Stephen
Dates Censused	23 Jan	19 Dec 23 Jan 20 Feb 27 Mar	9 Jan 20 Feb 27 Mar	19 Dec 6 Feb 6 Mar	5 Dec 23 Jan 6 Mar	5 Dec	9 Jan 6 Feb 6 Mar	5 Dec
Cars								
Resident	0	7	18	9	10	3	13	1
N. Res.	0	3	4	3	0	0	0	0
Hunters								
Resident	5	34	62	31.48*	36	8.48*	32.96*	3
N. Res.	0	8	18	16.24*	0	0	0	0
Bag Check								
E.H.	15	26	59	35.71*	19	5.85*	5	0
V.H.	0	3	20	3.07*	1	.93*	0	0
C.T.	0	9	4	0.97*	0	.85*	11	0
F.	0	0	2	0.10	0	.09*	0	0
European Hare Seen	0	0	6	11	10	1	0	0
Miles Driven	41	393	907	688	540	109	478	109
Hunters per mile	0.12	0.11	0.09	0.07	0.07	0.08	0.07	0.03
European Hare shot per mile	0.37	0.07	0.07	0.05	0.04	0.05	0.01	0

*Interpolated values based on figures presented in Table I

TABLE III SYSTEMATIC HARE SURVEY

RESULTS OF AIRCRAFT PATROLS

	12 December	16 January	13 February	Totals
1. Square miles covered	850	850	850	2550
2. Number of cars	14	21	9	44
Resident	13	17	8	38
Non-resident	1	4	1	6
3. Number of Hunters	45	87	48	180
Resident	42	70	44	156
Non-resident	3	17	4	24
4. Bag Check (European Hare only)	65	31	44	140
5. Hunters per sq. mi.	0.052	0.102	0.056	$\bar{x}$ = 0.070
6. Hare bagged per sq. mi.	0.076	0.036	0.052	$\bar{x}$ = 0.055

TABLE IV SYSTEMATIC HARE SURVEY

RESULTS OF EUROPEAN HARE SIGHTED AND SHOT ON DRIVES

		European Hare sighted	European Hare shot	Total	% Shot
Drives (2 drives each)					
1. Hunters & Staff	A.	11	3	14	21.4
	B.	6	2	8	25.0
Total		17	5	22	$\bar{x}$ = 22.7
2. Hunters only	A.	2	1	3	33.3
	B.	6	3	9	33.3
Total		8	4	12	$\bar{x}$ = 33.3

TABLE V SYSTEMATIC HARE SURVEY

SUMMARY OF RANDOM PATROL RESULTS

1 January to 27 March, 1965

1. Townships covered - Bruce, Saugeen, Kincardine, Ashfield

2. Miles covered -- 1293 miles

3. Cars checked (14 Bruce, 8 Saugeen, 7 Kincardine, 1 Ashfield)

   Resident -- 28
   Non-resident -- 2

4. Hunters checked 122.6*
   Resident 112.6*
   Non-resident 10

5. Bag Check -- 85* European Hare
   -- 14* Varying Hare
   -- 12* Cottontail
   -- 1* Fox

*Interpolated results based on figures obtained from Table I

Discussion of Results

Although the survey was not extensive, the coverage of townships in Huron and Bruce counties was complete enough to provide vital statistics on the value of the European hare to the winter hunt. It became necessary to interpolate statistics such as hunters per car (3.20) and bag check information (0.69 European hare per hunter per day, 0.11 varying hare per hunter per day, 0.10 cottontails per hunter per day and 0.01 fox per hunter per day) since in many cases only cars were checked because hunters were in the field.

Expanding the data collected for eight Saturdays in the open season (19 Saturdays for Hay and Stephen townships, 29 Saturdays for the remaining townships) 1593.9 hunter-days were spent by hunters primarily for European hare. The sampling procedure did not distinguish between European hare hunters and varying hare or cottontail hunters but the latter two appear to be minimal. No estimate of the hunting pressure exerted during the week is available.

In dealing with the complaints that preceded the project, all one need do is look at the ratio of resident; non-resident hunters (4.9:1) and the relative success of the two groups. Over the duration of the study, resident sportsmen bagged 0.50 hares per hunter per day while non-resident hunters bagged 0.55 hares per person per day. (Table VI)

Total bag statistics are very rough indeed but do give one an idea of the value of hare to the winter hunt. It should be noted that bag statistics are minimal figures since hunters were checked during the day and conceivably the figures would represent on the average only one-half days bag.

For 1593.9 hunter-Saturdays in the open season, the projected kill was 2500 European hares, 398 varying hares, 361 cottontails and 36 foxes. By comparing total kill statistics obtained from interpolation and actual bag checks, it would appear that 44 per cent of the hunters present at any given time were checked, which is rather high considering the area censused and the number of personnel involved. Pressing further our interpretation of figures obtained in this study, although the accuracy of the data would not justify the process, we can arrive at a rough estimate of the total European hare killed for all hunters present in the 10 townships between 6 December and 27 March. These lagomorphs were then harvested at a rate of 2.94 per square mile based on a total estimated kill of 2500 (1100 x 100/44). Our data presented in Table IV suggest that only 22.7 per cent of the hares seen in one drive were harvested. Realizing that we are dealing in minimal harvest figures with no confidence limits for our estimates, the European hare population in these 10 townships would have been 13.17 per square mile. Since the data used to arrive at this estimate consider Saturdays only, the true population of the study area could be and likely was at least twice the above calculated density. The productivity of the townships censused is presented in Figure 2.

Hunter densities over the 10 townships in Huron and Bruce Counties taken from Table II (Systematic patrols) were used in mapping the hunting pressure in Figure 3.

Table VI contains the temporal distribution of the European hare kill per resident and non-resident hunters throughout the period of study.

A comparison of hunter densities obtained from two sources is presented in Table VII along with an applied correction factor for conversion from one parameter to the other. It must be noted that the hunters per mile driven is the more reliable figure since the aircraft flew too high and too fast for a complete count of hunters present.

In summary, it would appear that the accusations of over-harvesting European hare by non-residents are unfounded and should be disregarded.

TABLE VI SYSTEMATIC HARE SURVEY

THE TEMPORAL DISTRIBUTION OF KILL PER UNIT EFFORT FOR RESIDENT AND NON-RESIDENT HUNTERS

	Hares per Resident	Hares per Non-resident
1. 5 December		
Twps-Stephen		
Hay		
Saugeen	0.32	____*
2. 19 December		
Twps-Colbourne		
Ashfield		
Bruce	0.64	____*
3. 9 January		
Twps-Stanley		
Goderich		
Kincardine	0.41	0.63
4. 23 January		
Twps-Morris		
Saugeen		
Colbourne	1.00	____*
5. 6 February		
Twps-Hay		
Bruce		
Stanley		
Goderich	0.15	1.28
6. 20 February		
Twps-Kincardine		
Colbourne		
Ashfield	1.44	0.64
7. 6 March		
Twps-Saugeen		
Bruce	0	1.83
8. 27 March		
Twps-Ashfield		
Colbourne		
Kincardine	0	____*

Overall averages 0.50 hares/resident; 0.55 hares/non-resident

* no non-resident hunters checked

TABLE VII SYSTEMATIC HARE SURVEY

COMPARISON OF HUNTER DENSITIES FROM TWO SOURCES

	Hunters/mile driven (car)	Correction	Hunters/sq. mi. (aircraft)
December 5	0.07		
12	0.085*	.59	0.05
19	0.10		
January 9	0.11		
16	0.085*	1.12	0.10
23	0.06		
February 6	0.05		
13	0.065*	.92	0.06
20	0.08		
Averages	0.08	.88	0.07

* mean figures taken from the first and last weeks in the month

Acknowledgments

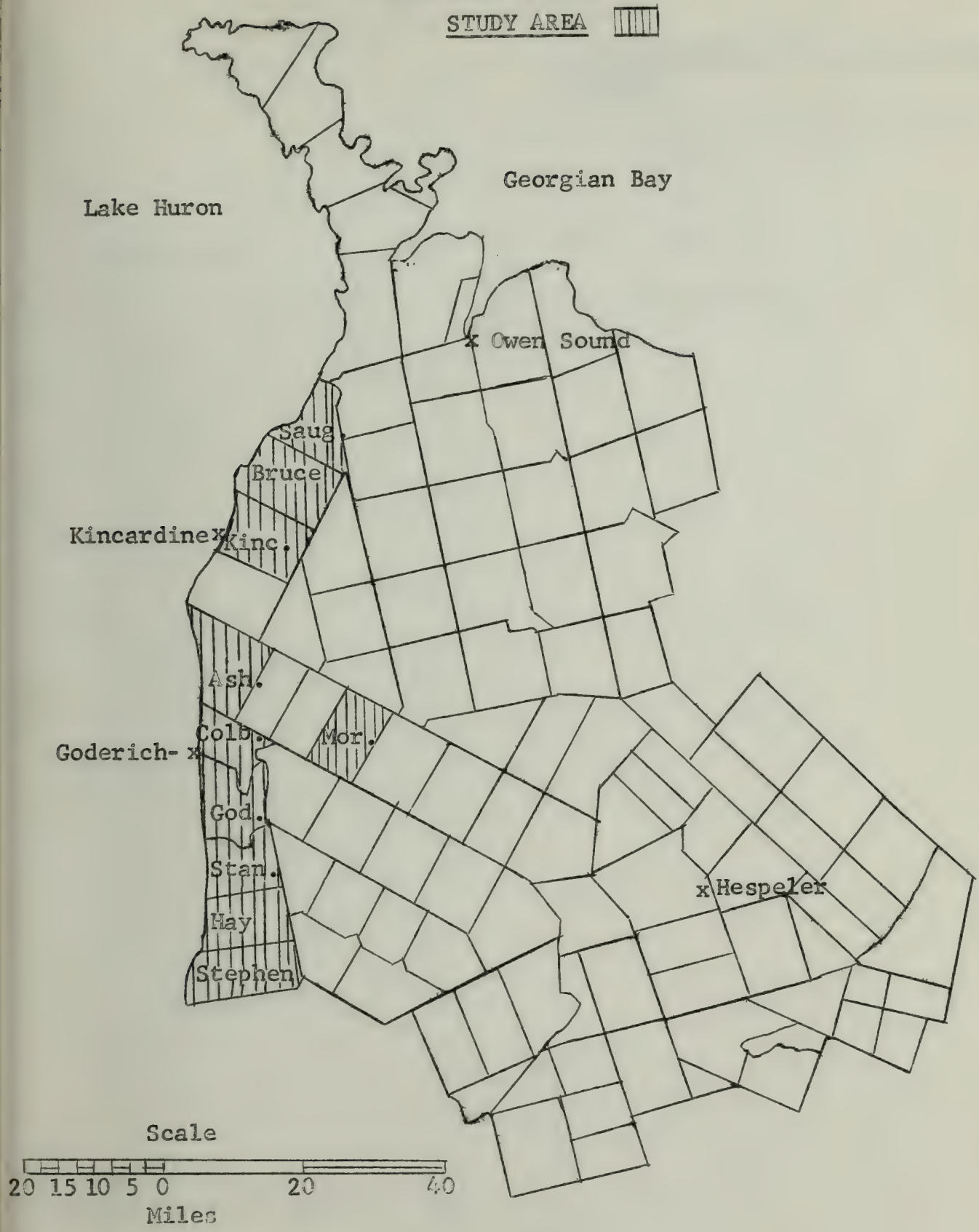
The organization and systematics of the study were carried out by R. E. Ivins and A. H. McIntyre while those contributing from the field were R. R. Bellinger, J. W. Taylor, G. R. Harris and R. A. Guenther.

Figure 1

LAKE HURON DISTRICT

HARE SURVEY 1964-65

STUDY AREA



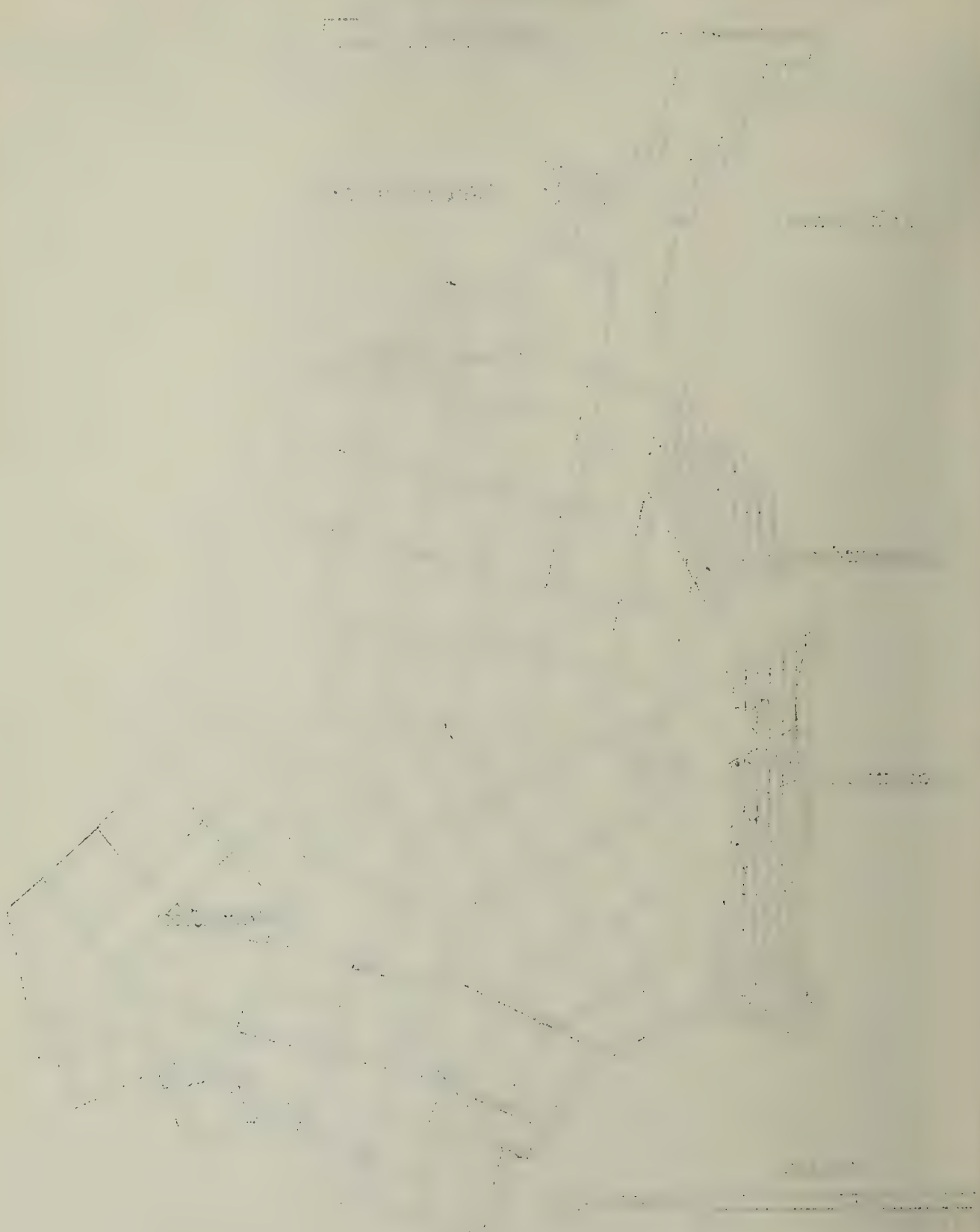


Figure 2

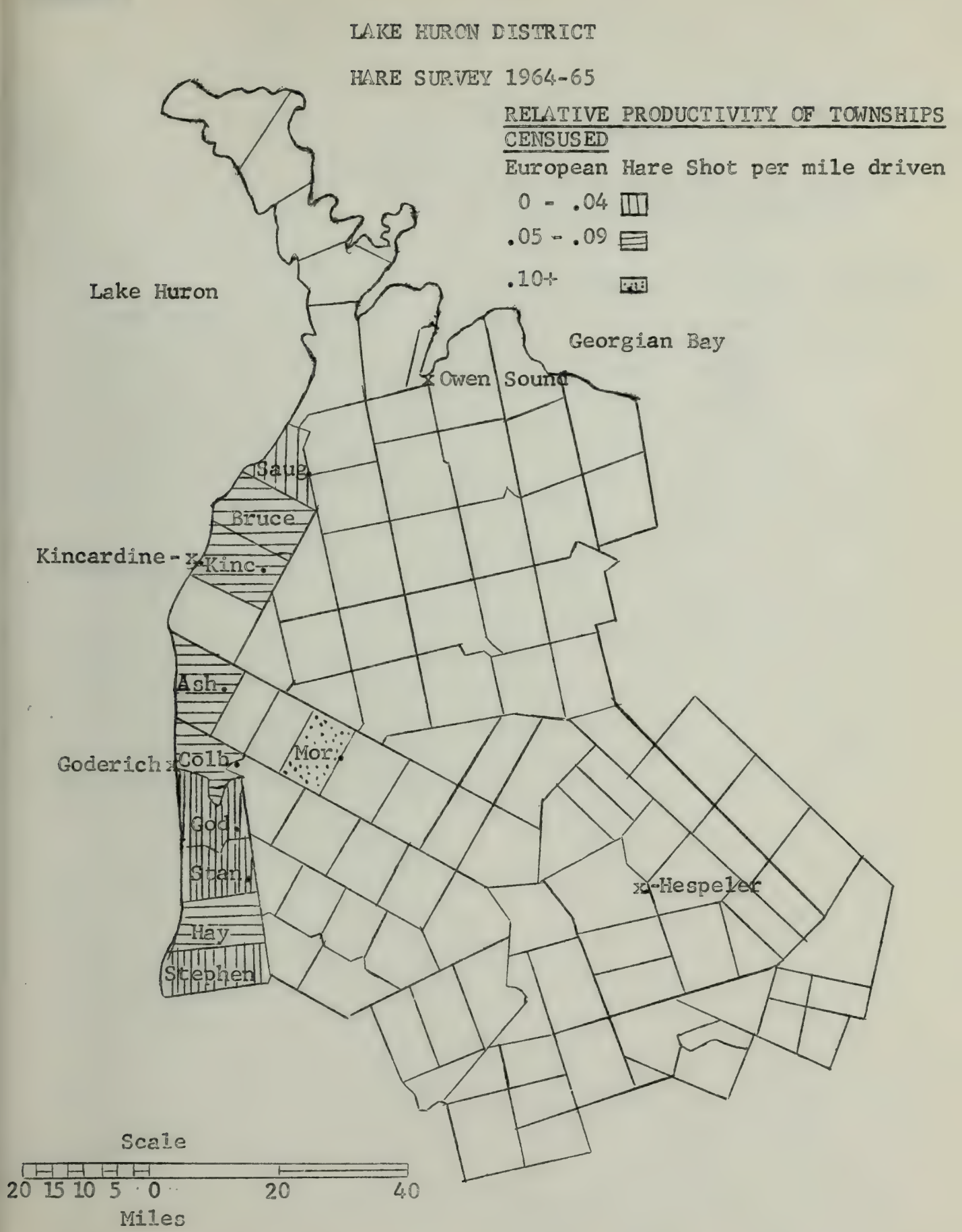
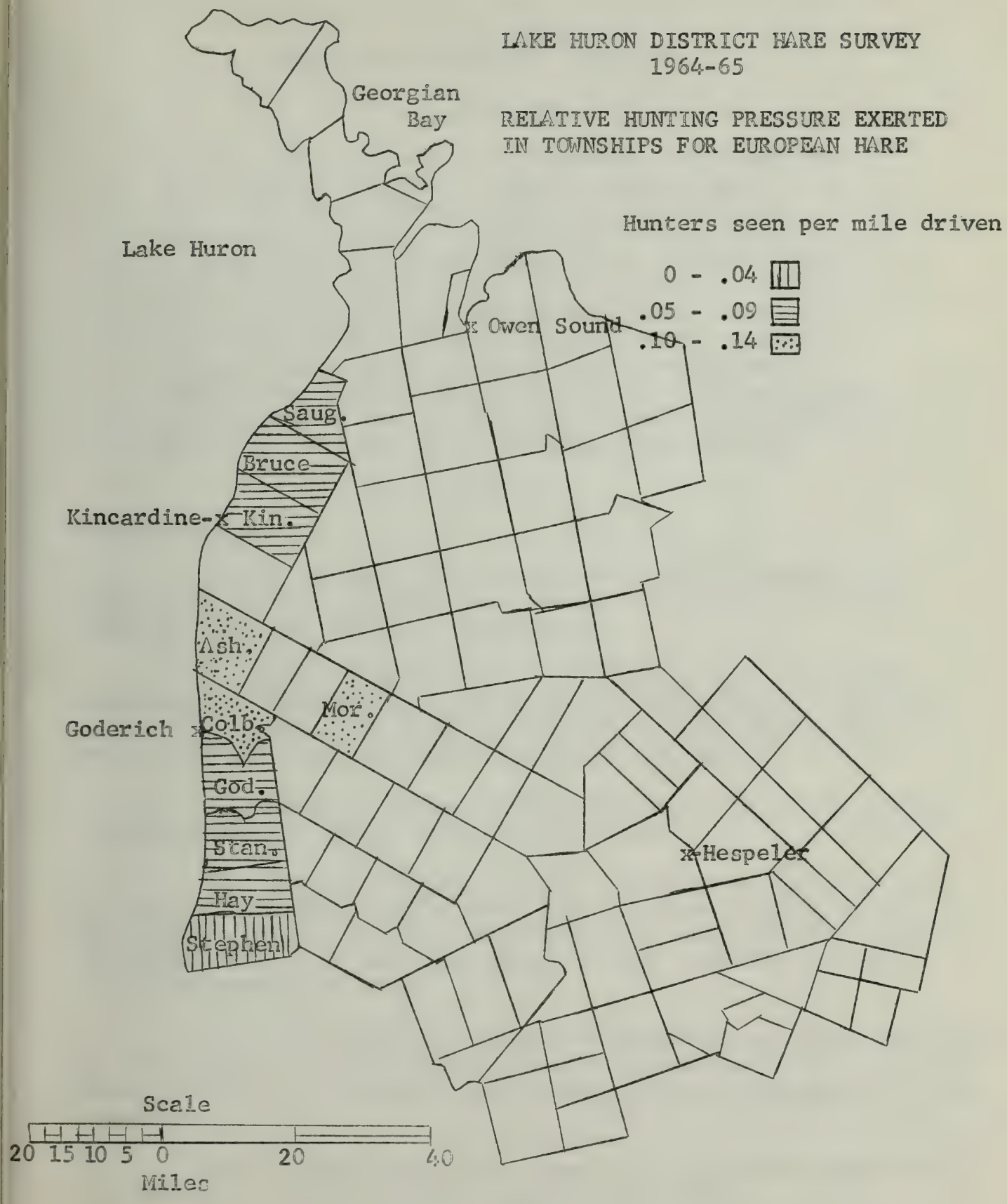
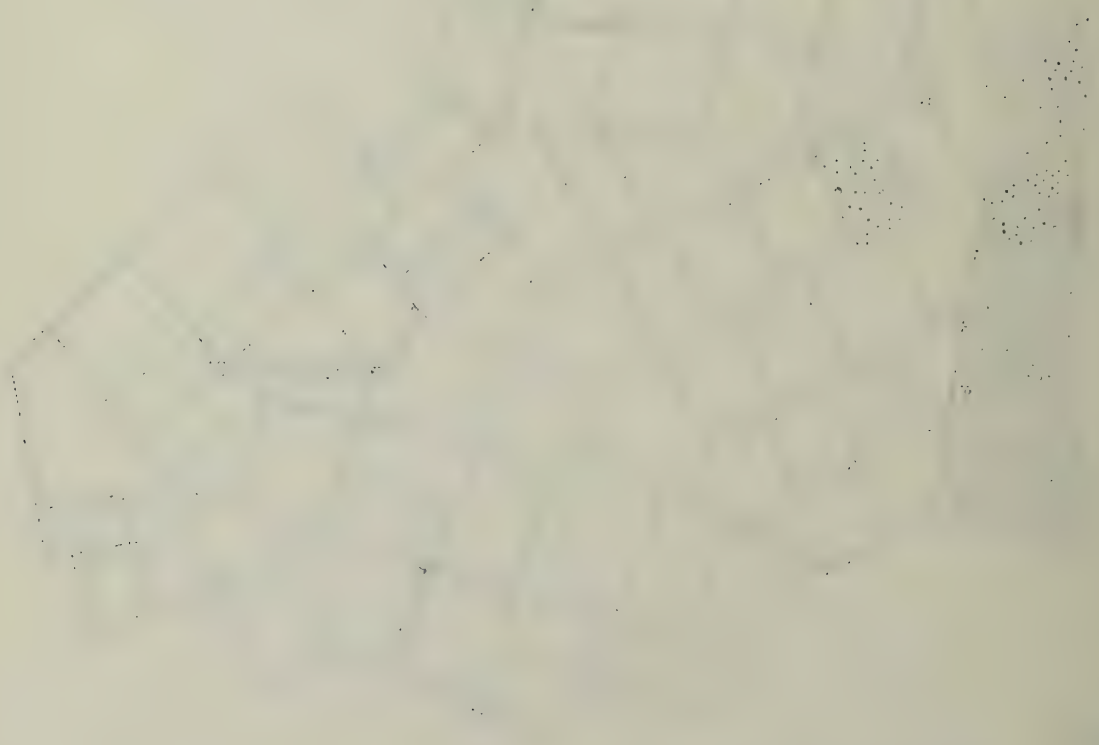

LAKE HURON DISTRICT
HARE SURVEY 1964-65
RELATIVE PRODUCTIVITY OF TOWNSHIPS CENSUSED
European Hare Shot per mile driven
0 - .04
.05 - .09
.10+
Lake Huron
Georgian Bay
Owen Sound
Saug.
Bruce
Kincardine
Kinc.
Ash.
Goderich
Colb.
Mor.
God.
Stan.
Hay
Stephen
Hespeler
Scale
20 15 10 5 0 20 40
Miles

Figure 3


LAKE HURON DISTRICT HARE SURVEY
1964-65
RELATIVE HUNTING PRESSURE EXERTED
IN TOWNSHIPS FOR EUROPEAN HARE
Hunters seen per mile driven
0 - .04
.05 - .09
.10 - .14
Georgian Bay
Lake Huron
Owen Sound
Saug.
Bruce
Kincardine
Kin.
Ash.
Mor.
Goderich
Colb.
God.
Stan.
Hay
Stephen
Hespeler
Scale
20 15 10 5 0 20 40
Miles



KENORA DISTRICT BAIT-FISH REPORT
1964

by
A. R. Olsen
Fisheries Management Technician

Abstract

Licences were issued to 86 fishermen to harvest and sell baitfish in 1964. Reports received from 79 of these fishermen showed a total catch of 294,479 dozen minnows valued at $142,210.00 for an overall average price per dozen of 49 cents. Revenue from sale of bait-fish licences in the District totalled $3,472.00. Annual earnings of fishermen ranged from a low of $24.00 to as high as $14,500.00. Overall average annual gross sales of the 42 reporting commercial-type operators was $2,991.00. Average annual gross sales of the 33 reporting Tourist Camp operators providing bait for their own camps was $503.00.

Introduction

As in the past, all Kenora bait-fish fishermen were required to submit a report for 1964 covering catch, sales and value of baitfish sold (see Appendix I).

A letter forwarded with each licence issued in 1964 outlined the importance of recording and reporting data and also warned that reissue of licences would not be considered unless a report was received at District office by January 31, 1965.

All returns received were submitted voluntarily without sending reminders as was done in past years.

In 1964, the entire District was blocked into bait-fish harvesting areas each corresponding to the area covered by one base map or "T" series map. Fishermen were assigned these blocks according to size of previous operation and proximity to areas and lakes previously held.

This was done to eliminate overlapping and confusion which was prevalent in the previous licencing system and also to provide better control of fishermen and subsequent better management of the resource.

New licences were only issued if a block was open or if one fisherman relinquished his rights to an area.

There are 146 of these blocks in the District. Fifteen remained unlicenced in 1964 because of remote location where accessibility is only possible by aircraft.

Licences were issued to 49 operators to harvest baitfish on a commercial basis for areas ranging from a quarter of a block to as high as 10 blocks.

Besides the 49 licences issued to the above, 37 licences were issued to Tourist Camp operators permitting the harvest of baitfish in the vicinity of their camps for sale to their own camp guests. The majority of the tourist operators licences are issued to camps in remote areas where a ready supply of bait is not available from wholesale outlets. Licences were for seines or traps or both.

The total of 86 licences issued is eight more than were issued in 1963. The additional licences were to camp owners. The number of regular full time fishermen remained the same as in 1963.

Data Received from Bait-fish Returns

Returns were received from 42 or 86 per cent of the full time fishermen and from 37 or 89 per cent of the tourist camp operators holding licences.

Those not reporting are known to hold licences to harvest bait as a hobby or to provide bait for guests at camps in emergencies. Neither of these two groups took any significant amount of baitfish. We are, therefore, assuming that the 79 licencees reporting caught 100 per cent of the District's 1964 production.

As fishermen are required to report sales to dealers as well as sales to anglers, it has not been necessary to request reports from dealers.

Table III and IV show sales by licenced fishermen classified by regular operators and Tourist Camp operators and by amount of sales.

Value of Equipment

Data previously obtained on value of equipment was of little value and, therefore, the requests for this information was discontinued. Aircraft, boats, trucks, pumps, etc. were included although their use in other fields was much greater than in harvesting and handling baitfish.

At some future date an attempt will be made to evaluate equipment used exclusively in bait-fish operations.

Methods of Harvesting Baitfish

Methods of harvesting baitfish are for the most part standard for each species. For example, all fishermen use seines to harvest shiners and all fishermen use traps for all other species. Some fishermen, however, have through experience found more successful means of setting traps and locations in which to set.

Some experiments have been carried out by individuals with larger size traps and different shaped traps, however, traps above the now legal size of 24 inches were not found to be effective. Different shapes have in some cases proven more effective. The most significant improvement in effectiveness was noted from the use of a clover-leaf type of trap.

The formation of a Bait-fishermen's Association in the District and the new licencing system has brought about better cooperation among fishermen. Problems and solutions to problems are now discussed more freely. Know-how previously retained in secrecy is now being passed on to fellow operators.

Although large amounts of baitfish are now required in the winter months, catching minnows through the ice has been no problem.

Types of Licences Held and Amount of Gear Licenced

The amount of gear used by each operator varies greatly with the size of operation and ranges from six to forty-five traps and one seine. Dip nets are seldom used.

Many tourist camps and fishermen hold dealer's licences. The regular fishermen hold such licences to permit the purchase of baitfish from others to fulfil committments when their production runs low.

Very little preserving is done but a few licences are issued.

The following is a breakdown of types of licences issued and revenue received from sale of these licences:

Type "G"

Seines	- 63 @ $10.00	$ 630.00
Traps	1031 @ 2.00	2,062.00
Dips	nil	

Type "E"			
	Dealers	76 @ $10.00	760.00
Type "F"			
	Preserving	4 @ $5.00	20.00
	Total		$3,472.00

The reduction in traps licenced resulted from the issue of licences by blocks where an operator can move his traps anywhere within his licenced blocks. Previously individual licences were held by each operator for single lakes or small groups of lakes permitting the use of various numbers of traps. Some fishermen held as many as 10 separate licences covering 80 or more traps.

Catch

The total catch of baitfish for 1964 was 294,479 dozens made up of the following species:

Chubs	226,095	dozen	77%
Shiners	45,328	"	15%
Suckers	19,118	"	7%
Others	3,938	"	1%
Total	294,479		100%

Kind of Baitfish Caught

Chubs still remain the most sought after baitfish because of their tolerance to handling and ability to survive for longer periods of time. The average size of 3" to 5" makes them more desirable.

Suckers are very desirable baitfish but suitable quantities are available only in the spring.

Shiners are available in large numbers during certain periods but will not withstand handling and must be sold immediately at or very near the location caught.

Most shiners are sold at the Town of Kenora where they are used by local fishermen who are only spending a short period of time on the lake, e.g. evening anglers.

Others include mainly fathead minnows which are used on a limited scale for crappie fishing and when larger more desirable species are not available. Some species of dace fall into this category as do various other species of minnows which are less abundant. Fatheads are very abundant in sizes up to about two inches in length.

Loss

Total loss indicated by difference between catch and sales is 2.5 per cent. It is estimated that loss may run as high as 5 per cent but operators are reluctant to report loss.

A loss of 5 per cent is not considered excessive and most losses resulted from handling shiners and suckers.

TABLE I - Sales Classified into Groups
Regular Commercial Bait-fishermen

	No. of Reporting Fishermen	% of Reporting Fishermen	Average Sales Per Fisherman	Total Sales
$			$	$
nil	2	4		
100 - under	4	10	40.75	163.00
101 - 500	4	10	309.50	1,238.00
501 - 1,000	8	19	618.37	5,947.00
1,001 - 2,000	7	16	1,549.71	10,848.00
2,001 - 3,000	4	10	2,258.50	9,034.00
3,001 - 5,000	4	10	3,707.25	14,829.00
5,001 - 10,000	6	14	7,619.00	45,714.00
10,001 - 15,000	3	7	12,616.33	37,849.00
	42	100		$125,622.00

TABLE II - Sales Classified into Groups
Tourist Outfitters

	No. of Reporting Fishermen	% of Reporting Fishermen	Average Sales Per Fisherman	Total Sales
$			$	$
nil	2	6		
100 - under	11	34	57.45	632.00
101 - 500	13	39	265.08	3,446.00
501 - 1,000	4	12	771.25	3,085.00
1,001 - 2,000	2	6	1,274.50	2,549.00
2,001 - 3,000				
3,001 - 5,000				
5,001 - 10,000	1	3	6,876.00	6,876.00
	33	100		$16,588.00

TABLE III - Catch Sales and Value by Species Showing Percentage of Each Species in Total Catch and Average Price per Dozen

Species	Catch in Dozens	Sales in Dozens	% of Total Sales	Total Value	Average Price per Dozen
Chubs	226,095	226,471	78.9	$108,629.00	.48
Shiners	45,328	43,292	15.1	21,338.00	.49
Suckers	19,118	13,298	4.6	10,080.00	.75
Others	3,938	3,938	1.4	2,163.00	.54
Total	294,478	286,999	100.0	$142,210.00	.49

Table III shows sales exceeding catch for chubs. This is explained as gains resulting when one fisherman sells in bulk (by gallon) to another who in turn sells by dozens.

Value of Baitfish Sold by Fishermen

Overall value of baitfish sold in 1964 was $142,210.00, a slight decrease from 1963 as shown in Table IV comparing sales from 1961 through 1964.

TABLE IV

	Chubs		Shiners		Suckers		Others		
Yr.	Dozens	% Total	Dozens	% Total	Dozens	% Total	Dozens	% Tot.	Total Value
61	99,719	69.3	34,506	24.0	4,600	3.2	5,066	3.5	$104,652.
62	183,161	76.2	40,482	16.8	12,122	5.1	4,570	1.9	118,040.
63	209,755	74.4	45,241	16.0	14,236	5.0	12,864	4.6	143,311.
64	226,471	78.9	43,292	15.1	13,298	4.6	3,938	1.4	142,210.

The average overall price per dozen of minnows for 1964 is 49 cents and compares very closely with 1962 and 1963 when average price was 49 cents and 50.8 cents, respectively.

From data received on questionnaires it was possible to calculate that chubs sold directly to anglers from fishermen averaged 52.7 cents per dozen and those sold to other dealers averaged 44.1 cents per dozen. Shiners sold directly to anglers averaged 52.3 cents per dozen and 37.4 cents when sold wholesale to dealers.

The amount of baitfish sold wholesale was 109,000 dozen chubs, 13,000 dozen shiners, 5,000 dozen suckers and others 4,000 dozen.

Markup on baitfish handled by dealers based on the above figures is estimated at approximately six thousand dollars.

Most tourist camps holding dealer's licences handle minnows merely as a convenience for guests. Sporting goods stores and service stations handle minnows as convenience and added service provided by their establishments.

Transporting and Holding Facilities

The use of electrical aerators has contributed greatly to the successful handling and holding of baitfish.

Spring fed ponds have been constructed by several operators and provide excellent holding facilities.

All major operators are continually experimenting with new methods of holding and transporting equipment.

The use of certain commercial type drugs has in many cases reduced loss from fungus type diseases.

Aircraft are now being used by ten of the larger operators. This type of tranpsortation although expensive has provided access to numberous waters where resources were previously not utilized.

Propagation

Propagation of baitfish has not as yet been attempted but at least two operators are now making plans to raise a portion of their requirements.

Feeding of Baitfish

Feeding of baitfish is done on a limited scale and only by those utilizing holding ponds. Minnows are stocked in the spring when easily caught and held until late July and August when the demand exceeds the quantity that can be caught at the time. Commercial-type feed is used to sustain the stock during holding period.

The size of baitfish held during this time is usually increased a certain amount by feeding.

Conclusion and Summary

The last few years has brought about some major improvements and progress in managing this resource.

One such improvement has been the establishing of blocks in which operators have exclusive rights to harvest baitfish.

This has overcome the overlapping under the previous licencing system where fishermen caught as much as possible whether or not he had a market for his catch. This was done to deprive his competitors of a supply.

A considerable amount of deliberate damage to equipment such as traps and boats was previously experienced. This problem is now non-existent.

Operators are now free to farm their licenced areas and harvest or rest lakes as they see fit to ensure a sustained yield.

Recommendations

1. It is recommended that consideration be given to licencing fishermen with a fee per area rather than by the amount of gear used.

   It is now an impossible task to control numbers of traps and under a block system management would not be dependent on restricting traps but rather licencees would control harvest to maintain sustained yield.

2. It is also recommended that the investigation into the bait-fish industry be continued and a report submitted regarding future plans for orderly harvest and management.

   Although some plans are now being made in this District for future management of this resource, we are awaiting the results of the province-wide survey conducted by Mr. Robert Payne.

Reference

Olsen, A. R., 1963. Kenora District Annual Baitfish Report, Unpublished Department of Lands & Forests District Report.

Appendix 1

ANNUAL COMMERCIAL BAITFISH RETURN
For Year Ending Dec. 31, 196___

No. of Traps Licenced _____
No. of Seines Licenced _____
No. of Dip Nets Licenced _____

Do you Hold a Licence to Preserve Baitfish? Yes ☐ No ☐
Do you Hold a Baitfish Dealer's Licences? Yes ☐ No ☐
Do you Operate During Summer ☐ Winter ☐ Both ☐

Record of Catch (To be completed by Baitfishermen Only)

Chubs _____ Doz. Suckers _____ Doz.
Shiners _____ Doz. Others _____ Doz.

Record of Sales (To be Completed by Dealers & Baitfishermen)

Species	Sold to Anglers Dozens	Sold to Anglers Value	Sold to Dealers Dozens	Sold to Dealers Value
Chubs				
Shiners				
Suckers				
Others				
Totals				

No. of Lakes Fished _____

Name or Locate Body of Water from Which Majority of Baitfish Were Taken _____ Estimate % _____

Do you Use Small Lakes or Holding Ponds to Retain Minnows? Yes ☐ No ☐

No. of Dozen Pickled or Salted ☐

The above Return is correct to the best of my knowledge and belief.

_____
Signature

Remarks _____